

## CLAIMS

1) A method for measuring the wettability of a porous rock sample in the presence of water and oil, characterized in that it comprises determining the water wet pore surface and the oil wet pore surface when the sample is saturated with water and oil, and  
 5 calculating the wettability index by combination of the values obtained for said surfaces.

2) A method as claimed in claim 1, characterized in that determination of the water wet pore surface and of the oil wet pore surface when the sample is saturated with water and oil is obtained by means of measurements of relaxation times ( $T_1, T_2$ ) of the sample  
 10 placed in a nuclear magnetic resonance device.

3) A method as claimed in claim 1 or 2, characterized in that the wettability index is obtained by the relation :

$$I_{NMR} = \frac{SM_w - SM_o}{SM_w + SM_o}$$

where  $SM_w$  is the water wet pore surface and  $SM_o$  is the oil wet pore surface when the porous medium is saturated with water and oil.

15 4) A method as claimed in claim 1 or 2, characterized in that the wettability index is obtained by the relation :

$$I_{NMR} = \log_{10} \frac{SM_w}{SM_o}$$

where  $SM_w$  is the water wet pore surface and  $SM_o$  is the oil wet pore surface when the porous medium is saturated with water and oil.

5) A method as claimed in any one of the previous claims, characterized in that the wettability index is determined by the following operations :

- a) measuring the characteristic relaxation times of the water-saturated sample ;
- b) measuring the characteristic relaxation times of the oil in the sample in the presence  
5 of water, in a zone close to saturation (Swir) of the sample ;
- c) measuring the characteristic relaxation times of the water in the sample in the presence of oil, in a zone close to residual saturation (Sor) ;
- d) measuring the relaxation times of the sample in a state where its 100 % oil saturation point is reached ; and
- 10 e) combining the measurements of the various relaxation times so as to obtain said index.

6) A method as claimed in claim 5, characterized in that the relaxation times of stages a) to c) are measured after subjecting the sample to centrifugation.

7) A method as claimed in claim 5, characterized in that the relaxation times of  
15 stage d) are measured after forced displacement of the fluids in the sample placed in a containment cell.

8) A method as claimed in any one of the previous claims, characterized in that an oil whose intrinsic relaxation time ( $T_B$ ) is as great as possible and as close as possible to that of the water is selected.

20 9) A method as claimed in claim 5, characterized in that the characteristic relaxation times are those corresponding to either the saturation curves maxima, or to mean values of said curves.